

Description

The invention concerns a junction part according to the preamble of patent claim 1. Such junction parts are commonly used in the construction of frameworks for example.

Such a junction part according to the preamble of the claim is known from DE-A 2 305 330. It has roughly the shape of a sphere in which radial drillings are formed for secure screwing of framework bars or the like. In addition, attachment surfaces are provided around these drillings on the outside of this junction part to provide good support for the framework bars or the like on this junction part.

Above all, this known junction part has the drawback that it consists of two parts connected by a flange, namely a larger and a smaller spherical portion. First, the associated framework rods must be attached to each of these two spherical portions and only then can these spherical portions be connected securely to one another along their flange. This makes assembly and dismantling difficult. Interim releasing or removal or replacement or subsequent insertion of a rod is not possible since for this the two spherical portions first have to be separated from one another again.

EP-A 81 608 and FR-A 2 452 628 show a junction part which also has roughly the shape of a sphere and is also composed of two spherical parts of different sizes which are held together here by a bolt which extends from one pole of this sphere to the other pole. In addition to the drawbacks of such a design named previously, here there is also the disadvantage that no bars or rods can be attached to the poles although this is nearly always required. Rods also cannot be attached to certain spherical portions when the interior of the sphere is made accessible by means of a detachable closing cap, for rods cannot be attached in the area of this cap. Such junction parts with detachable closing caps are shown for example in DE-C 841 351 and EP-A 81 608 already named.

Moreover, a junction part is known from DE-C 901 955 with the shape of a sphere which is provided with 18 uniformly distributed threaded drillings and attachment surfaces surrounding these. Attachment is effected by means of special rods the ends of which are each provided with a coupling sleeve in the form of a hexagonal nut in which is disposed a screw which is connected to this coupling sleeve in such a way that it is displaceable axially but cannot turn. This known arrangement has the drawback that the

rods - which are required in relatively large quantities - are extremely expensive and that a framework formed with these is rather unattractive aesthetically since the connecting elements are clearly visible from outside.

In addition, a coupling for roof beams is known from Soviet Inventions Illustrated, Engineering Section, Week B20, 20th June 1979. This coupling has two oval rings which can be turned relative to one another and are held together by bolts at their common axis. In each of these oval rings are slots to receive screws with which the roof beams are attached. These oval holes and the bolts in the common axis are designed to permit precise adjustment of the roof beams, as is also necessary in prefabricated building. This is a component for prefabricated building with which there are a large number of adjustment possibilities but the attachment possibilities are limited and completely non-existent in the direction of the pivot axis for example.

Therefore, one object of the present invention is to create a junction part which has a simple construction, permits attachment of many components and, after assembly, still permits simple fitment or removal of a rod from a rod system without any other alteration to this rod system being necessary for this purpose.

According to the invention this object is achieved through the measures disclosed in claim 1. Through the openings provided in the near-equatorial regions screws and tools can be introduced into the interior of the junction part easily and conveniently so that these screws can be secured or undone as desired, regardless of whether other rods are already attached to the junction part or not. The possibility of attaching rods all over such a junction part makes this usable in many ways.

With a junction part according to the invention, an additional component can be inserted in the system or removed completely from it at any time without this necessitating any change in the position of the remaining junction parts. In addition, spatial rod systems constructed with such junction parts have an aesthetically attractive appearance. In addition, such a junction part requires no threaded drillings, for simple stamped holes suffice so that such a junction part can easily be painted in any colour.

It is particularly advantageous that the strip-shaped sections have essentially the same angular interval between them. This gives a symmetrical structure with an aesthetically pleasing appearance.

One very advantageous variant of such a junction part is characterised in that in the region of the equator of the structure the strip-shaped sections each comprise attachment surfaces which are essentially perpendicular to a plane extending through an element disposed at a pole and provided with an attachment surface. This gives connection possibilities both in the horizontal and the vertical direction, which is particularly important in practice.

One preferred embodiment of the invention which is particularly important in practice and also very attractive aesthetically is characterised in that the strip-shaped sections have the form of two polygonal rings each comprising common elements at the poles of the structure and extending perpendicularly to one another. In practice it has been shown that this form can be used in many ways and also exhibits very good static loading characteristics, and that it permits construction of spatial rod systems which are very attractive aesthetically. Such a junction part could also be described as a spherical skeleton composed of a plurality of polygonal ring sections.

Further details and advantageous developments of the invention will become apparent from the embodiment examples which are described in the following and illustrated in the drawing and are not to be taken as limiting the invention, and from the subordinate claims.

Fig.1 is a plan view of a sheet-metal blank for the production of one half of a junction part according to one preferred embodiment example of the invention;

Fig.2 is a side view showing two claw-shaped identical parts produced from sheet-metal blanks as in Fig.1 prior to their junction along the common equator;

Fig.3 is a side view of a junction part according to the invention produced as in Fig.2 in a position turned through 90° in relation to Fig.2;

Fig.4 is a plan view in the direction of arrow B in Fig.3 of the junction part illustrated in Fig.3 with a rod attached at the side by means of an additional attachment part;

Fig.5 is a perspective view of the junction part in Fig.3 and Fig.4, together with the end of a rod to be attached;

Fig.6 shows the attachment of the junction part to the end of the rod illustrated in Fig.5;

Fig.7 is a perspective view of the junction part in Fig.3 and Fig.4 with the ends of four rods extending in different directions, and

Fig.8 shows the front end of a commercially obtainable hexagonal screwdriver with a spherical end.

Fig.1 shows a sheet-metal blank 1 with four arms 2 of equal length and attachment holes 3 and half attachment holes 3' at the free ends of the arms 2.

In Fig.2 the four arms 2 are each bent through an angle α of 135° relative to the pole surfaces 4 and 4' which are square and of the same width as the arms 2, and then bent again through the same angle α of 135° at a point 5 so that four claws 6 extend towards each other from each of the pole surfaces 4 and 4' and can be brought into contact with one another along an equator and joined together for example by butt-welding, glueing, brazing or the like.

Fig.3 shows the structure 7 of the junction part so formed, which can also conceivably be composed of three structure parts, namely a continuous ring 8 of diameter D with the shape of a regular polygon, here an octagon, and attached to it two polygonal sections 9 and 10 which extend at right angles to this ring 8 and connect the two pole surfaces 4 and 4' like a bridge. The individual surfaces or side parts of the spatial polygon so formed are marked 4'' and in their middle each have an opening 11, which openings correspond to the openings 3 and 3' in Fig.1. The middle axes 12 of these openings 11 meet, as shown in Fig.3, at the centre point 13 of the junction part 7, i.e. extend radially.

Between the structure parts 8, 9 and 10 the junction part 7 has four elongated openings 30 which, as shown, have roughly the shape of compressed hexagons and serve as assembly openings. Each of their opposite median sections 31 and 32 (Fig.7) extend parallel with one another and therefore permit the insertion, as in Fig.4, of an attachment part 33 which is rectangular in plan and engages behind the neighbouring side sections 4'' with two opposing strips 34 projecting at the sides. It is used for attachment of a rod 25 which is supported on the parallel edges 31 and 32 and fixed to the attachment part 33 by means of a hexagon socket head screw 35 (with a round head 37) which passes through this part 33 and is screwed into an internal thread in the rod 25. In this way an attachment part 33 can be inserted in each of the openings 30 and a rod 25 attached to it. The eight triangular openings which are then left still allow access to the entire interior of the

junction part 7 in this case.

If the junction part 7 is to be connected to the end 14 of a rod 15 shown in Fig.5, a fixing screw 16 must first be introduced into the space 17 surrounding the structure parts 8, 9 and 10, then the threaded shank 18 of this screw 16 must be passed through the opening 11 in question until the screw-head 19 rests flush on the inside 20 of the side part 4" concerned. Then the junction part 7 is located on the end 14 of the rod 15, whereupon the screw 17 is turned by means of a screwdriver 21 indicated in Fig.8 and thus the threaded shank 18 is screwed into the axial threaded bore 22 in the end 14 of the rod. Expediently, so-called hexagon socket head screws, i.e. screws with a hexagon socket in the head 19, are used to ensure sure location of the screwdriver 21 and thus secure insertion of the screw 16. The use of such hexagon socket head screws also brings the further advantage that such a screwdriver 21 can also be used at an angle to the screw head 19 so that the screwdriver 21 can also be inserted through the gaps 23 between the components 8 - 10. In this connection, it is particularly advantageous to use a commercially obtainable hexagon screwdriver with a profile as in Fig.8. Its shank 40 has the cross-section of a regular hexagon. At the tip the shank 40 initially tapers at a location 41 - maintaining its hexagonal profile - and then terminates in a sphere 42 which also has a hexagonal cross-section overall. Such a screwdriver can still be applied to a hexagon socket head screw at an angle of about 25° and thus makes it very easy to turn the screw 16 or 37 through the side openings 30. If other screwdrivers are employed, a universal joint of the kind found in many toolboxes can also be used if necessary.

Lastly, Fig.7 shows a junction part 7 to which the ends 24 of different rods 25 each pointing in different directions are already screwed.

Now, if an additional rod is to be inserted between two such junction parts 7 already firmly incorporated into a rod system, this can be done easily and simply in that the rod in question is introduced between the two opposing junction parts and screwed to these junction parts by means of the fixing screws 16. If an existing rod is to be removed, the procedure is reversed. In both cases the junction parts 7 can remain in their original position so that dismantling or even partial dismantling of the assembled rod system is unnecessary.

A junction part according to the invention can be seen as a combination of at least two interlocking strip-shaped polygonal or circular rings of essentially the same diameters and with the same centre point. Where they cross,

these polygonal or circular rings have elements in common, and preferably - as in the case of the embodiment example - their longitudinal axes stand perpendicular to one another. However, polygonal ring structures are also possible in which, for example, polygonal rings are disposed with the same angular intervals between each other, e.g. three rings with intervals of 120° in each case. Naturally, a polygonal ring can also cross with a circular ring. Such and other variations lie within the scope of the present invention.